Atmospheric Science Data Center Sample Data Analytics Use Cases

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How NASA Is Meeting the Big Data Challenge

"Discovery hinges on data, which is challenging for NASA based on sheer volume and the distributed nature of the storage archives. Users require tools that support large-scale data movement. **There is also the looming need to develop platforms that meet the computational and analytic requirements of the coming exascale era**."

http://www.hpcwire.com/2014/04/07/nasa-meeting-big-data-challenge/

ASDC Goal

To enable users to leverage data to observe more phenomena than what can be identified by studying an average.

This will require:

- Understanding of what analysis is desired and how it will be generated from data sets
- Performance of analytics on data sets
- Validation of results
- Application of comparative analytics

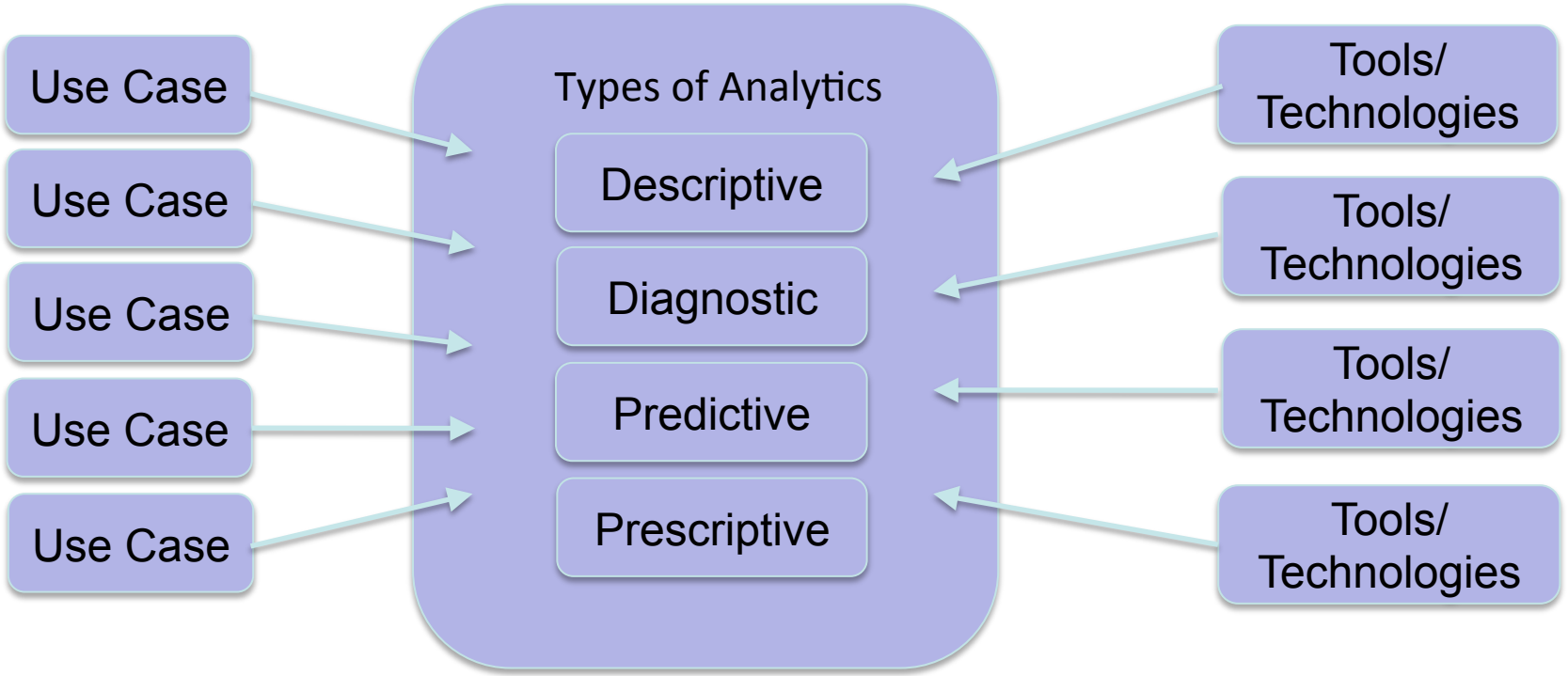
Ideal Applications

Analytics to enable:

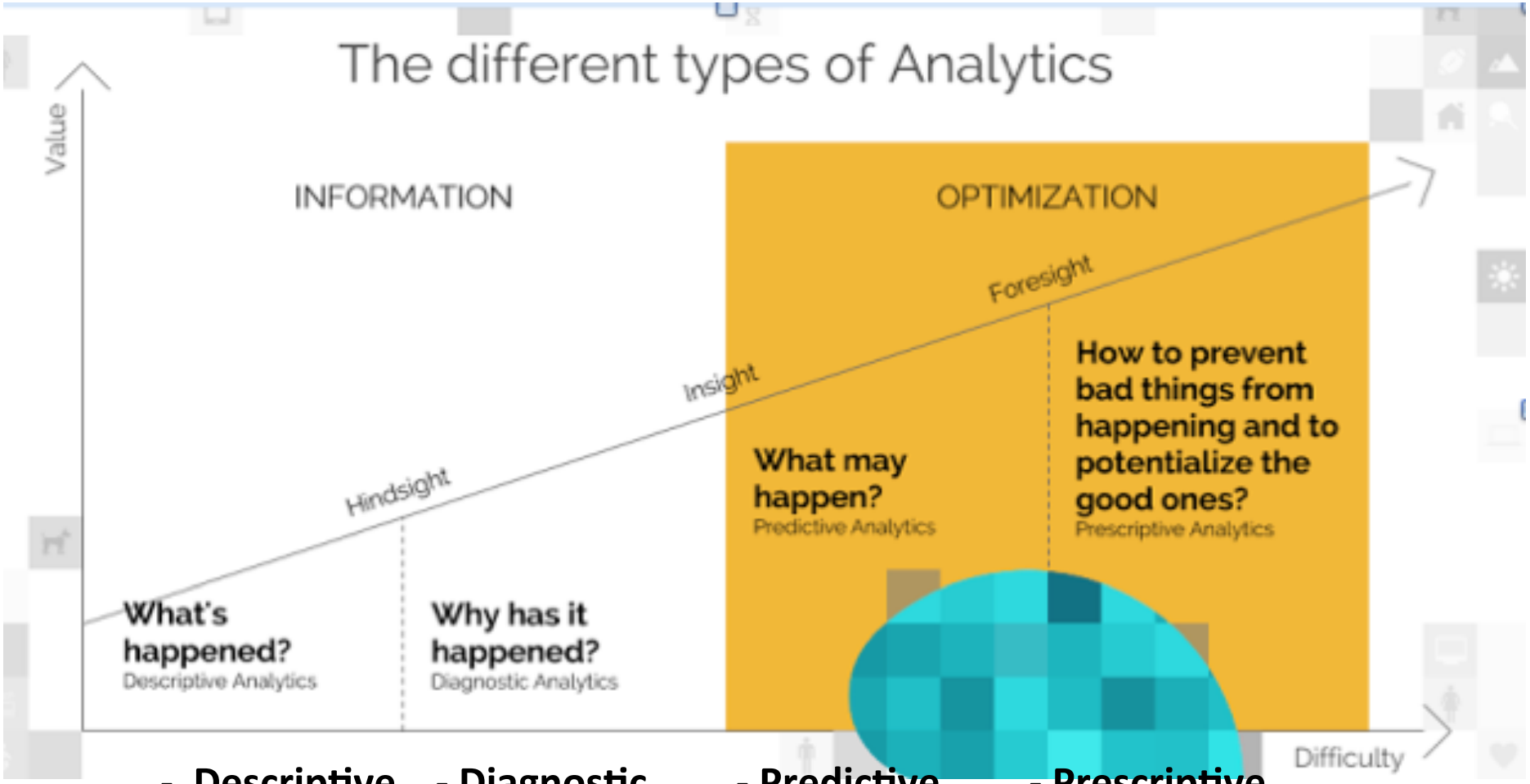
- **Inter-calibrations among datasets**
  - Different instruments
  - Evaluate incremental improvements to data reduction algorithms or to models
- **High resolution intercomparison between two or more model or data products**
  - Better than global monthly means
    - Ability to show point by point comparisons of specific locations
- **Users to select a value from a Level 2 (or higher) data product to go back to see the original source data components (in the Level 1 product).**

Discussion Questions

1. What are your most time consuming data tasks that can leverage analytics?
2. Identify and discuss different types of analytics
3. What kind of data analytics is needed for specific use cases?
4. Identify tools and technologies that address different types of analytics



Different types of Analytics



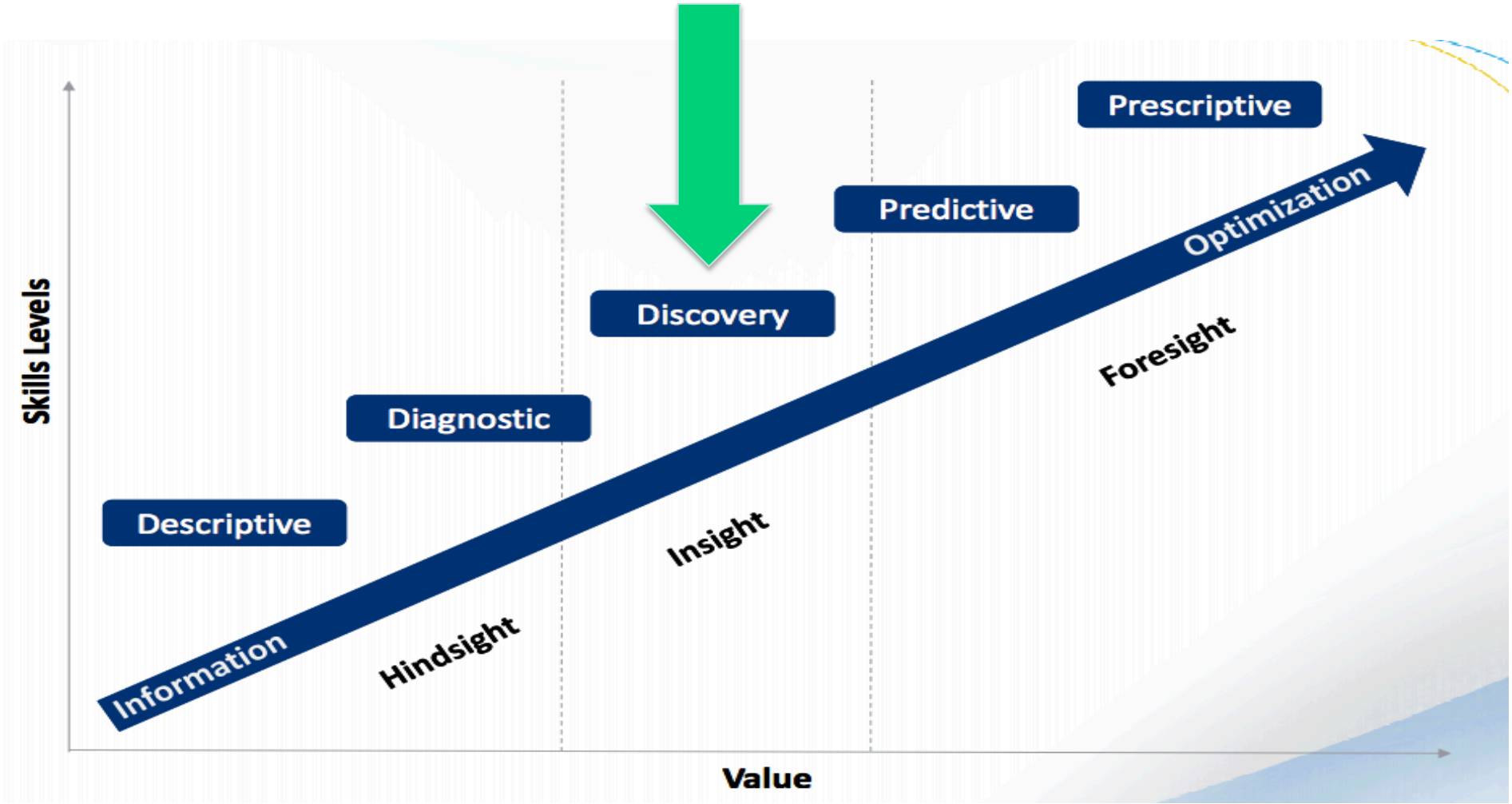
- **Descriptive** - **Diagnostic** - **Predictive** - **Prescriptive**

From: http://www.ciandt.com/card/four-types-of-analytics-and-cognition

One More Type…

Discovery Analytics:

This is where people learn from the data.



http://www.informationbuilders.es/intl/co.uk/presentations/four_types_of_analytics.pdf

Types Defined

Descriptive Analytics:
You can quickly understand "what happened" during a given period in the past and verify if a campaign was successful or not based on simple parameters.

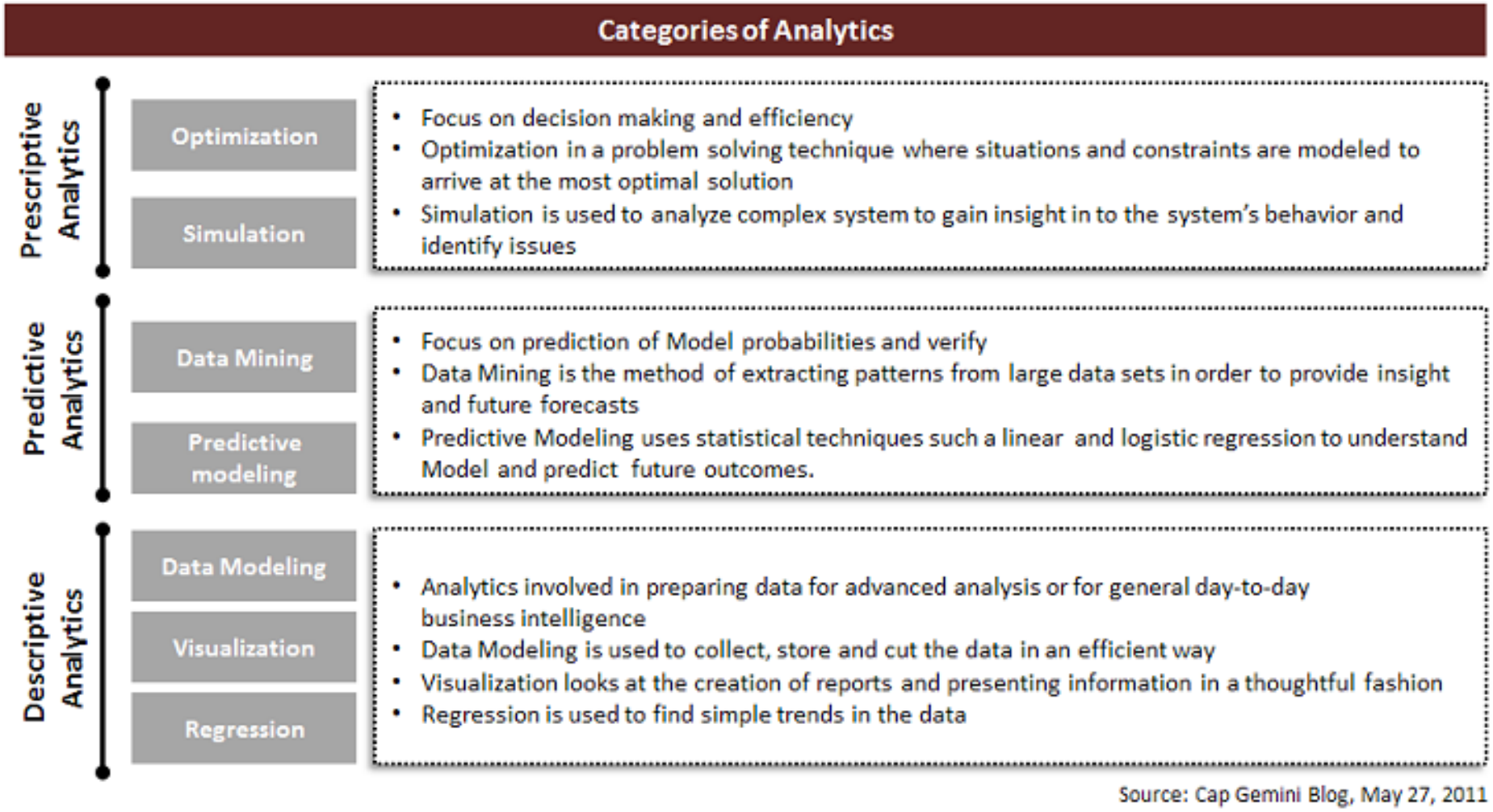
Diagnostic Analytics:
If you want to go deeper into the data you have collected from users in order to understand "Why some things happened," you can use … intelligence tools to get some insights.

Predictive Analytics:
If you can collect contextual data and correlate it with other user behavior datasets, as well as expand user data … you enter a whole new area where you can get real insights.

Prescriptive Analytics:
Once you get to the point where you can consistently analyze your data to predict what's going to happen, you are very close to being able to understand what you should do in order to maximize good outcomes and also prevent potentially bad outcomes. This is on the edge of innovation today, but it's attainable!

From: http://www.ciandt.com/card/four-types-of-analytics-and-cognition

More Details Categories



From: http://steinvox.com/blog/big-data-and-analytics-the-analytics-value-chain/

Suitable Technologies

…A/B testing, association rule learning, classification, cluster analysis, crowdsourcing, data fusion and integration, ensemble learning, genetic algorithms, machine learning, natural language processing, neural networks, pattern recognition, anomaly detection, predictive modelling, regression, sentiment analysis, signal processing, supervised and unsupervised learning, simulation, time series analysis and visualisation.

www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation